

THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXPERIMENT STATION
KNOXVILLE 16

404996

REPLY TO

UT-AEC AGRICULTURAL RESEARCH PROGRAM

P. O. BOX 142

OAK RIDGE, TENNESSEE

December 30, 1954

Director
United States Atomic Energy Commission
Las Vegas Field Office
Post Office Box 2088
Las Vegas, Nevada

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Dear Sir:

After intensive investigation over a period of a year we are prepared to make this report regarding the cattle belonging to the Stewart Brothers of Las Vegas, Nevada.

Attention is invited to report from this office 16 June 1953 and letters to Stewart Brothers, 30 November 1953 (through AEC-Las Vegas) and letter to Dr. Pearson, 14 January 1954 (copy to UT-AEC, Las Vegas).

The opinions below are based on the following experimentation:

- a) Total body irradiation of Hereford cattle (15 exposed to 350 r gamma radiation and 2 exposed 7000 r gamma radiation).
 - b) Experimentally produced beta burns on cattle (2).
 - c) Analyses of I-131 in thyroid glands of cattle.
 - d) Pathology of tissue.
 - e) Feeding of flesh of cattle to test animals.
- 1) Experimentally exposed animals (7000 r or 39 r/hr until death).
 - 2) Cow with external beta burns received in vicinity of Alamogordo Test 1946.
 - 3) Cow with few beta burns received in vicinity of Nevada Proving Grounds, 1953.

Conclusions: a) Clinical syndrome and hematologic responses of cattle exposed to lethal or non lethal (but critical) doses of gamma radiation did not resemble signs noted in Nevada Cattle.

b) Experimentally produced beta particle lesions indicated by the dose depth and time of occurrence relations demonstrate that the skin lesions on the Nevada cattle were produced by small particulate substances from which beta-particles were emanating at a relatively slow rate or an accumulative dose of less than 5000 rep in 3 months to areas less than 20 mm in diameter and a median range of about 4 mm in depth.

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c) The maximum amounts of I-131 in the thyroids of a Stewart Brothers cow was 0.02 microcuries per gm as of 6-24-53. Apparently normal cattle on pasture near Oak Ridge, Tennessee and others in various parts of the country reported by Van Middlesworth (Nucleonics 12, 56, 1954) contained a maximum of .005 uc/gms of I-131 as of 6-12-54, indicating that doses of these magnitudes occurred over various parts of the United States and were tolerated without apparent damage. The thyroids of these cattle examined by the UT-AEC group had a normal histopathologic pattern.

d) Complete histopathological examinations were made of tissues of cattle exposed to controlled sources of ionizing radiation and compared to tissues taken from cattle of the Stewart Brothers herd. Except for beta burns, no indication of irradiation damage, present in irradiated control animals, could be demonstrated in tissues of the Nevada cattle. Examinations were made independently by pathologists of UT-AEC and AFIP and independently reported. It is of interest that the suspected presence of chronic anaplasmosis in this herd was noted by both laboratories.

e) Radioactivity in the flesh of animals marked by beta-burns following the Alamogordo Tests 1946 and the Nevada Proving Grounds Tests of 1953 could not be detected above background in our laboratories. When fed to test animals (chickens, rats and dogs) there was no concentration of radioactive elements in any tissues. The prolonged feeding of the flesh sustained growth as well as control animals and was completely wholesome. (Detail report on wholesomeness of flesh of irradiated animals submitted to AEC).

After a complete review of veterinary literature and many consultations regarding the eye lesions observed in cattle of the Stewart Brothers herd in January 1954, we must conclude that the external eye lesions seen in the Stewart Brothers cattle have been observed and adequately described in all noted forms by Dr. E. R. Frank, (J.A.V.M.A. 102, 200-3, 1943) and in the USDA yearbook of agriculture 1942 "Keeping Livestock Healthy". It is stated specifically that Hereford cattle, particularly of the West and Southwest United States, have a high incidence of the disease. Recent statistics furnished by the United States Department of Agriculture indicate a high natural incidence of the disease. However, as only selected individuals of the Stewart Brothers herd were examined the incidence was not determined.

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The observed uveitis or iridocyclitis of cattle has not been reported in any veterinary literature that has come to our attention. However, Lt. Col. T. C. Jones, V. C. of AFIP (consultation) observed a similar condition in non-irradiated animals in 1945-46. Since few people have critically observed the bovine eye it is perhaps not remarkable that the normal incidence is unknown.

Ophthalmologists studying ocular lesions due to ionizing radiation at the School of Aviation Medicine, USAF and the Oak Ridge National Laboratories have suggested that the observed changes are not immediate results of ionizing radiation.

Therefore all consultants were in agreement that the eye conditions observed resembled naturally occurring diseases of cattle more than any reported ocular lesions due to radiation. In this we concur.

We cannot urge too emphatically the need for continued observations of indigenous animals of the Nevada Proving Ground area. The group at the School of Aviation Medicine have reported eye damage due to radiation of the light spectra as far away as 40 miles from the detonations. The pathologists are reviewing the histology of ocular lesions from animals experimentally irradiated with ionizing radiation. However, without a background of natural occurring diseases of the eyes of domestic animals, opinions of investigators must of necessity be empirical.

Yours truly,

BFT:f

Bernard F. Trum
Lieutenant Colonel, Veterinary Corps
United States Army